

to deal. Is music, in the English sense of the word, which no wise differs from the Italian, an art or a science? It is clearly both; but the art, *μουσική*, so far predominates in public acceptance and cultivation over the science, *ἀρμονία*, that the latter is, and has been for many centuries, in danger of succumbing altogether. Indeed, though excellently begun by Euclid in his "Sectio Canonis," it remained all but unadvanced until the recent researches of Helmholtz. It is to Aristotle that we owe the general test by which to distinguish an art from a science; a test so satisfactory and so neat, that it produces the effect on the mind of a mathematical demonstration; a form of proof which is too often only a roundabout way of restating a self-evident proposition. Aristotle said that art at its best only works by "rule of thumb"; and states that *τέχνη* is governed by rules. When these rules are found to rest on recognised laws, the art becomes an *ἐπιστήμη*, or science. This observation, made two thousand years ago by the shrewdest of all shrewd observers, remains as true and as fresh as on the day when it was promulgated. To no branch of human learning does it apply with such force and directness as to music. For perfection in this art has always been, is now, and must continue to be, confined to a few sensitive, delicate, finely-strung natures, which differ from those of their fellow-creatures in possessing a peculiar technical power and organisation such that they instinctively reproduce, and as it were consonate to the musical conceptions of other minds. In all other respects they may be self-indulgent, unbusinesslike, unpractical; even, as indeed not uncommonly they are, over-sensitive and disagreeable. Types of this class are Beethoven, Cherubini, Mozart, Weber, and Berlioz. In them, in fact, the full development of artistic perfection has eaten up all other good qualities, and left no time or inclination for what Plato calls "the practice of virtue." The world at large, secretly conscious of its special inferiority, and always willing to discharge itself of an unwelcome responsibility, too commonly looks upon these exceptional natures as representing the whole, and not only the artistic and executive side of music. But the other exists notwithstanding; and its fuller cultivation will tend much to restore the balance so disturbed. In this respect the little book of Dottore Crotti has special value. It deals with the foundation of rhythm and of music, and with the strange and hitherto unexplained emotional difference between the major and minor scales, which in the Italian are prettily and correctly named *Gaia* and *Triste* respectively. The ratios of musical intervals and their combination are fully treated, and with some features of novelty, especially as concerns their physiological effects on the ear. The great fact, so much forgotten in this century since the brilliant jigs of the Rossinian school have become popular, that it is the bass, and not the treble or melody, which is fixed and fundamental, is stated with abundant emphasis, and distinction is made between the characters of repose and of movement in different kinds of music. The assumption that the scale is founded principally on the fractions representing the major and minor tones with only a simple semitone of $\frac{1}{2}$ seems hardly sufficient to meet theoretical requirements; but otherwise there is much of interest comprised within the 55 pages of which the pamphlet consists. It has the merit, moreover, beyond the historical point already noted, of bearing out its title of "acoustico-physiological," and of adverting to the mental or receptive side of musical impressions more than occurs in some modern treatises.

W. H. STONE

THE REMARKABLE SUNSETS

THE following letter has been sent to Mr. Norman Lockyer:—

The remarkable sunsets which have been recently witnessed upon several occasions have brought to my

recollection the still more remarkable effects which I witnessed in 1880 in South America, during an eruption of Cotopaxi; and a perusal of your highly-interesting letter in the *Times* of the 8th inst. has caused me to turn to my notes, with the result of finding that in several points they appear to have some bearing upon the matter which you have brought before the public.

On July 3, 1880, I was engaged in an ascent of Chimborazo, and was encamped on its western side, at 15,800 feet above the sea. The morning was fine, and all the surrounding country was free from mist. Before sunrise, we saw to our north the great peak of Illiniza, and twenty miles to its east the greater cone of Cotopaxi, both without a cloud around them, and the latter without any smoke issuing from its crater—a most unusual circumstance; indeed, this was the only occasion on which we noticed the crater free from smoke during the whole of our stay in Ecuador. Cotopaxi, it should be said, lies about forty-five miles south of the equator, and was distant from us sixty-five miles.

We had left our camp, and had proceeded several hundred feet upwards, being then more than 16,000 feet above the sea, when we observed the commencement of an eruption of Cotopaxi. At 5.45 a.m. a column of smoke of inky blackness began to rise from the crater. It went up straight in the air, rapidly curling, with prodigious velocity, and in less than a minute had risen 20,000 feet above the rim of the crater. I had ascended Cotopaxi some months earlier, and had found that its height was 19,600 feet. We knew that we saw from our station the upper 10,000 feet of the volcano, and I estimated the height of the column of smoke at double the height of the portion seen of the mountain. The top of the column was therefore nearly 40,000 feet above the sea. At that elevation it encountered a powerful wind blowing from the east, and was rapidly borne for twenty miles towards the Pacific, seeming to spread very slightly and remaining of inky blackness, presenting the appearance of a gigantic inverted L, drawn upon an otherwise perfectly clear sky. It was then caught by a wind blowing from the north, and was borne towards us, and appeared to spread rapidly in all directions. As this cloud came nearer and nearer so of course it seemed to rise higher and higher in the sky, although it was actually descending. Several hours passed before the ash commenced to intervene between the sun and ourselves, and when it did so we witnessed effects which simply amazed us. We saw a green sun, and such a green as we have never, either before or since, seen in the heavens. We saw patches or smears of something like verdigris-green in the sky, and they changed to equally extreme blood-reds, or to coarse brick-dust reds, and they in an instant passed to the colour of tarnished copper or shining brass. Had we not known that these effects were due to the passage of the ash, we might well have been filled with dread instead of amazement; for no words can convey the faintest idea of the impressive appearance of these strange colours in the sky, seen one minute and gone the next, resembling nothing to which they can be properly compared, and surpassing in vivid intensity the wildest effects of the most gorgeous sunsets.

The ash commenced to pass overhead at about mid-day. It had travelled (including its detour to the west) eighty-five miles in a little more than six hours. At 1.30 it commenced to fall on the summit of Chimborazo, and before we began to descend it caused the snowy summit to look like a ploughed field. The ash was extraordinarily fine, as you will perceive by the sample I send you. It filled our eyes and nostrils; rendered eating and drinking impossible; and reduced us to breathing through handkerchiefs. It penetrated everywhere, got into the working parts of instruments, and into locked boxes. The barometer employed on the summit was coated with it, and so remains until this day.

That which passed beyond us must have been finer still. It travelled far to our south, and also fell heavily upon ships on the Pacific. I find that the finer particles do not weigh the $1/25,000$ part of a grain, and the finest atoms are lighter still. By the time we returned to our encampment the grosser particles had fallen below our level, and were settling down into the valley of the Chimbo, the bottom of which was 7,000 feet beneath us, causing it to appear as if filled with thick smoke. The finer ones were still floating in the air, like a light fog, and so continued until night closed in.

In conclusion, I would say that the terms which I have employed to designate the colours which were seen are both inadequate and inexact. The most striking features of the colours which were displayed were their extraordinary strength, their extreme coarseness, and their dissimilarity from any tints or tones ever seen in the sky, even during sunrises and sunsets of exceptional brilliancy. They were unlike colours for which there are recognised terms. They commenced to be seen when the ash began to pass between the sun and ourselves, and were not seen previously. The changes from one hue to another, to which I have alluded, had obvious connection with the varying densities of the clouds of ash that passed; which, when they approached us, spread irregularly, and were sometimes thick and sometimes light. No colours were seen after the clouds of ash passed overhead and surrounded us on all sides.

I photographed my party on the summit of Chimborazo whilst the ash was commencing to fall, blackening the snow furrows; and, although the negative is as bad as might be expected, it forms an interesting souvenir of a remarkable occasion.

EDWARD WHYMPER

December 21

NOTES

THE announcement that Prof. Flower has accepted the appointment of superintendent at the Natural History Museum, vacated by the resignation of Prof. Owen, is premature, though we believe that steps are being taken to secure Prof. Flower's services for that important appointment.

WE regret to have to record the death of M. Yvon Villarceau, one of the astronomers of the Paris Observatory and a member of the Academy of Sciences for more than twenty years. M. Yvon Villarceau had been a pupil of the École Central des Arts et Manufactures, and was regarded as one of the most eminent of French mathematicians.

IT has been arranged by H.M. Trawling Commissioners that Prof. McIntosh, of the University of St. Andrews, will proceed systematically at intervals (probably once a fortnight) to the trawling grounds on the east coast of Scotland for the next six months, and undertake certain investigations concerning the grounds and their inhabitants. Each trip will probably occupy about two days. The Granton General Steam-Fishing Company's steam-trawler *Wallace*, which is fitted with all the recent appliances for such work, and is a swift and powerful steamer, will be used for the investigations, which will be at once commenced. An experienced long-line fisherman and trawler from St. Andrews (Alex. W. Brown) will accompany the professor as assistant.

THE friends of the late Mr. W. A. Forbes, the Prosector of the Zoological Society of London, have decided to collect his most important papers in a memorial volume, and the following gentlemen have been appointed to act as a committee for this purpose:—Prof. Flower, Prof. Bell, Mr. H. H. Johnston, Mr. Mivart, and Mr. Sclater. The committee find that Mr. Forbes's papers can be most suitably republished in a form similar to that adopted in the memorial volume of the memoirs and papers of Mr. Forbes's predecessor in the Prosectorial office (the late Prof. Garrod). Following the precedent of the "Garrod

Memorial Committee," they propose to ask for subscriptions of one or more guineas, and to give to subscribers a copy of the work for every guinea subscribed. Mr. Sclater will edit the Forbes Memorial Volume, Mr. Johnston will prepare a biographical notice and portrait, and Mr. F. Jeffrey Bell, 5, Radnor Place, Gloucester Square, W., will act as Secretary and Treasurer.

THE appointment of a Japanese student as assistant to the Professor of Anatomy at Berlin has been approved by the Minister of Public Worship.

MR. FRANCIS ELGAR, Consulting Naval Architect and Engineer in London, has been unanimously elected by the Glasgow University Court to the John Elder Chair of Naval Architecture.

AN expedition is at last being organised under the auspices of the British Association to proceed to Mount Kilimanjaro, the snow-clad peak of Eastern Equatorial Africa. The party will be under the charge of Mr. H. H. Johnston, who has recently returned from the Congo. The party will leave England at the beginning of March.

HEAVY indeed is the burden of educating laid upon the Southern States! With only one half at school of a population the illiterate proportion of which, among both whites and negroes, is increasing, and in some States this increase of illiteracy greater among the whites than among the negroes; with the negro, the non-taxpaying element, increasing fastest, notwithstanding white immigration; with trades destroyed, and property in consequence reduced in value 40 per cent., and in some States still falling in value; with the franchise, nevertheless, given to this increasing body of ignorance; evil indeed may be the result to a republic if the whole Union does not assist to correct it. Emancipation was a national act, and the nation ought to meet the inevitable consequence. So urges Dr. Haygood, in the United States educational circulars referred to last week, with the warning that no white men will agree for long to be voted down by a majority of illiterate blacks and whites.

ON Thursday, at 9.21 p.m., a shock of earthquake was felt in Fünfkirchen, a town in the south of Hungary, not far from the confluence of the Danube and Drave. The shock lasted two seconds, and was accompanied by a loud underground rolling noise. At the same time a similar earthquake and noise occurred at Barcs, a place to the south-east of the former, on the banks of the River Drave. Both shocks moved northwards. An earthquake shock was also felt at Lisbon at 1.30 a.m. on the 22nd inst., but did not excite much notice. A second shock, which lasted twelve seconds, occurred two hours later; being accompanied by subterranean rumblings, it awoke the entire population, and caused a panic among the inhabitants in the narrow streets. The seismic wave passed from north-west to south-east.

THE fourteenth Annual Report of the Botanic Garden Board of New Zealand (1883) contains valuable information as to the ravages of certain scale insects (*Coccidae*) in the colony. They appear to be principally of two kinds: one is an *Icerya*, nearly related to the sugar-cane pest of Mauritius, &c., the other a *Mytilaspis* allied to the common "apple scale" (*M. pomorum*). The *Icerya* is called the "wattle blight," but appears by no means to confine its ravages to the wattle trees. According to Mr. Maskell, it is the *Mytilaspis* that is the more serious, for it overruns in countless millions all kinds of fruit and other trees (fortunately it appears to be enormously infested and destroyed by a parasite). With regard to remedies, there is a little vagueness in the Report, owing apparently to the confusion of the two insects. The first portion speaks only of the *Icerya*, and states that Mr. Engle of Nelson had completely destroyed it by the